Optimization
Frequently Asked Questions
Compilation of Questions from Geographic Area Briefings

NO.	FPA SUBJECT AREA	ANSWER BY	QUESTION / COMMENT **ANSWERS**
1.	Optimization		At one-hour processing time, what is interval to check for containment? Is the containment interval a variable that can be adjusted? In the current formulation of FPA PM, intervals will not be used. Containment will be determined based on a continuous function. When cumulative fireline production equals cumulative fire perimeter, containment is achieved.
2.	Optimization		Is the optimizer a stochastic model? If so, how many iterations until it stabilizes? The optimization model is not stochastic but is driven by data inputs that are stochastic. The fire scenario that is analyzed by FPA is generated by probability distribution of fuels, fire occurrence, weather and the like. FPA uses a "pseudo-random number" to generate the fire scenario from the various probability distributions. By using a "pseudo-random number" the fire analyst can re-generate the same fire scenario by using the same starting point for generating random numbers.
3.	Optimization		What is "acres protected"? Acres protected refers to the number of acres that do not burn within a planning unit during the modeling effort. How do you measure? Acres protected can be determined by taking the aggregate total of acres being protected within the Fire Planning Unit (FPU) and subtracting the modeled acres that burned in an analysis. Acres burned is measurable? Acres burned is essentially the photo negative of acres protected. By adding acres burned and acres protected the answer must equal the acres in the FPU.
4.	Optimization		How does the model deal with availability, i.e., air tanker is only available 40% of the time. The Core Team is currently working on a process to include the use of national shared resources for initial attack.
5.	Optimization		Wildland – urban interface and structure protection – the fire line production usually has higher costs with more personnel – is that in the model? FPA PM determines the cost to contain a fire in the most cost effective manner based on fire behavior, surface fuel model, slope, relative importance of the FMU involved, etc. Fireline production rates are standardized by Kind, Category, Type and Staffing by surface fuel model. The cost of fire resources will be set at the geographic area level.

6.	Optimization		Is the resource optimization done fire by fire? Each modeled fire event will be "fought" many times with many combinations of fire resources within the optimization routine. The optimized result will represent the most effective mix of fire resources that "fought" all of the fires for a fire scenario which is a statistical representation of all fires within a calendar year. In reality, the optimization routine looks at all of the fires simultaneously. On the effectiveness optimization graph, does the curve go through the origin of the chart (O, O)? Theoretically, the curve could pass through the origin, but realistically it will probably never happen. Because of the formulation for weighted acres managed, effectiveness will likely never equal zero.
7.	Optimization		Why does FPA use cost-effectiveness as an economic goal, rather than a measure that looks at returns and costs (PNV or benefit cost)? In many fields such as national defense, health care, medicine and the environment it is often expensive, problematic or socially insensitive to address the benefit of public activities in dollar terms. Recognizing this Congress passed the Government Performance and Results Act requiring all federal government agencies to conduct performance based planning. In performance based planning, outcomes are measured in physical terms that are meaningful to the level of analysis and problem at hand. In initial attack where many sensitive environmental attributes are being protected, we use a performance measure (weighted acres protected). This means that we can perform a meaningful analysis of the problem without placing a dollar value on everything. Placing a dollar value on everything was found to be expensive and unreliable. Do the fire strategies for suppression, fire use, and fuels management change as you move from low to high on the capability curve? For a given analysis, fire management strategies do not change, but the relative contribution to effectiveness (weighted acres managed) of the various strategies may change. Do the weights change at different budget levels? Risks change? Weights and risks do not change based on cost levels.
8.	Optimization		Can you describe the transitions along the budget/effectiveness frontier with respect to tactical resources and support structure? Does the increase or decrease of resources link logically? Don't know what this means.

9.	Optimization		Would designating a FMU as a wildland fire use management strategy compete poorly for $$ with a FMU managed as a WUI? Not necessarily. Many factors go into the determination of which fire resources will be funded. In comparing WFU and WUI there are several things that the model will take into consideration. One of these is the relative weighting that occurs between FMU's in FPA PM. WFU weights result in positive weighted acres managed while WUI weights result in negative acres managed. Applying weights of 10 to the WUI and 1 to WFU may well result in a different mix of resources than if I weighted WUI a 5 and WFU a 10. Other factors that may figure in are travel time to initial attack events, production rates, fire behavior and the total cost constraint.
10.	Optimization		What does the model do when too few acres burn in an FMU, which has IU objective? I am assuming that IU is equivalent to Wildland Fire Use. If the model does not burn enough acres to meet the objective threshold, the output report will reflect that the objective was unsuccessful in that FMU. Should be placing priority on using Rx fire in Phase II.
11.	Optimization		Will FPA model simultaneous fire events at both the FPU and the FMU scale? The analysis is performed at the FPU level so all simultaneous fire events are accounted for at the FPU level. And, still ensure IA resources are available to protect high value FMU, i.e., urban interface? Can you tell model which dispatch location can provide IA for specific FMUs? All resources in our dispatch area really are not available to go any where and leave large areas unprotected. FPA PM will determine the mix of resources from which dispatch location will achieve the highest effectiveness for a given cost level. Budgeted resources can be restricted from going to FMU's for various reasons, but are not constrained to respond to specific FMU's.
12.	Optimization		Optimizer summary – on the frontier curve – will the current fire program be represented? FPA PM will have the capability to analyze where your current organization lies in relation to the budget submission analysis. If not, why not? Evaluating management objectives – will this be done on an FMU basis? If you have two different agency lands in one FMU it may be a problem. Evaluating management objectives will be done at the FMU level. If land management objectives are not equivalent across different agency lands, a single FMU may not be appropriate.
13.	Optimization		Would the FPA model when analyzing interagency dispatch locations recommend dropping one agency's resources over another agency? FPA PM will determine the most cost effective organization for a Fire Planning Unit (FPU). The cooperators within the FPU ultimately decide ownership of resources within the FPU.

14.	Optimization		Since program is built for out year planning; is there ability to show trending of increased – initial attacks and increased fire potential – severity, i.e., extended drought – climatology; i.e., projected bug kill – mortality? Changes in fuel type can be changed in comparative analysis runs. Current fuel types will be utilized for any budget submission analysis. Are you considering using the MM5 projects – Blue Sky in northwest for modeling fire spread and weather? We are not aware of either of these programs, thus they are not being considered for use in FPA PM. In probability are you considering extended attack? Extended attack will be considered in Phase II of FPA.
15.	Optimization		In regard to "system generated" and optimizer (may add a budgeted resource like another TY 6 engine), can FPA also take away a resource? FPA will consider all resources that have been listed in current and extended dispatch location capacities. FPA will determine the most cost-effective mix of fire resources for a given cost level constraint. The output may have new resources or may not use existing resources in the most effective organization.
16.	Optimization		What triggers or guides the "optimizer" to choose the optimal response and effectiveness? Objectives and goals? A predetermined rate at diminishing return? There is no single optimal response and effectiveness. FPA PM will generate a frontier that displays the most cost effective organization at the FPU level for various cost levels.
17.	Optimization		Regarding the mathematical formula – do you guys know that there is an error in the 7th step? The (R-1) MNO fa-1 is not VdED. Everyone knows this is not correct!! Two wrongs do not make a right. Agreed, but falsifying a mistake is even worse.
18.	Optimization		What is an optimizer? In terms of FPA PM, it is a mathematical formulation that utilizes fire behavior, weights and fire management resource cost and fire line production inputs to determine the most cost-effective fire organization at different cost levels.